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Journal of Acute Medicine 1 (2011) 27–29

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Case Report

Blunt traumatic laceration of the aorta

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Received 2 April 2010; accepted 19 May 2011

Available online 14 September 2011

Abstract

Background: Traumatic aortic injuries with aortic lacerations or ruptures are a common cause of death after blunt chest trauma.

Purpose: The mortality rate is higher than 90%, so rapid examination and treatment can be challenging for emergency physicians.

Method: A 20-year male patient that suffering from major thoracic trauma due to a motor vehicle accident was selected.

Results: Resuscitation with appropriate therapy can be life-saving first aid intervention. Computed tomographic angiography is the best choice for the definitive diagnosis of aortic injuries.

Conclusion: An aortic injury or laceration is suspected, early consultation with the trauma team and appropriate preparation for an emergency operation should be in place before the necessary examinations, thus the survival rate in the ER may improve.

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Keywords: Blunt chest trauma; Laceration; Traumatic aortic injury

1. Introduction

Trauma is the leading cause of death in teenagers worldwide. Traumatic aortic injuries with aortic lacerations or ruptures are a common cause of death after blunt thorax trauma.^{1–3} Such injuries are most commonly caused by the rapid deceleration and shearing forces sustained in motor-vehicle accidents (MVAs), falls from heights, and crushing injuries of the chest. The proximal descending aorta is the typical point of injury because of the fixation of the vessel between the left subclavian artery and the ligamentum arteriosum.¹ More than 90% of patients who sustain this type of injury die at the scene of the accident. Of the remaining 10% who survive, 50% die within 24 hours and 90% die within 4 months.^{2,4} Therefore, a rapid and accurate decision-making

process is needed and this can be a challenge for emergency physicians as the primary survey is carried out. Resuscitation with appropriate therapy according to the clinical situation is the first priority in saving the lives of such trauma patients and reducing mortality.

2. Case report

A healthy 20-year-old male who had suffered major thoracic trauma due to an MVA was brought to our emergency department (ED) by emergency medical technicians. The initial examination revealed that the patient was clearly conscious. His initial hemodynamic variables were relatively stable, with blood pressure of 119/82 mmHg, a pulse rate of 89 beats/min, a respiration rate of 24 breaths/min, body temperature of 37 °C and a Glasgow Coma Scale score of E4M6V5. The patient complained of chest pain with shortness of breath, and his SpO₂ value was 91%. On the basis of the Advanced Trauma Life Support protocol for primary survey and resuscitation, we arranged a chest X-ray and bedside sonography. The chest X-ray revealed an irregular contour of

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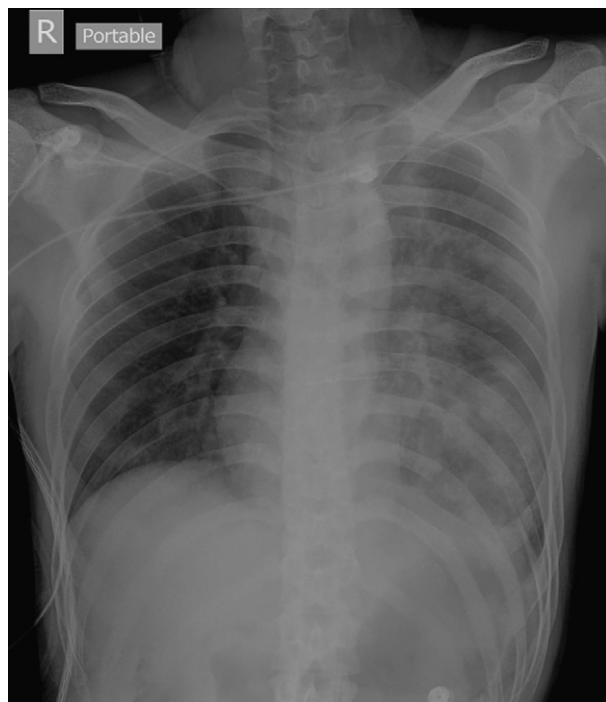


Fig. 1. Chest X-ray revealing an irregular contour of the left mediastinum with increased lung infiltration. Otherwise, the image is normal.

the left mediastinum with increased lung infiltration; otherwise the image was normal (Fig. 1). However, the patient's hemodynamic state became unstable after 30 minutes in the ED, with blood pressure of 88/47 mmHg, a pulse rate of 125 beats/min and a respiration rate of 30 breaths/min. Thus, fluid resuscitation and a blood transfusion were given and an endotracheal tube was inserted immediately. After a relatively stable hemodynamic state was reached, a contrast-enhanced multi-detector row computed tomography (CT) scan of the chest and abdomen was performed to investigate the cause of the hypotension. An axial CT image showed a disruption at the aortic isthmus, with extravasation of the contrast medium into the left pleural cavity indicative of a hemothorax. An aortic laceration with active bleeding was diagnosed (Fig. 2A and B). We immediately consulted with thoracic and cardiovascular surgeons to continue resuscitative measures and to arrange emergency surgery for the patient. However, within 30 minutes his hemodynamic state worsened rapidly, which resulted in sudden cardiac arrest. Cardiopulmonary resuscitation was performed but there was no response from the patient. Finally, the patient was declared dead in the ED.

3. Discussion

Traumatic aortic rupture is a common cause of death after an MVA.^{1–3} The most common associated injuries include lung injuries, cardiac contusions, internal abdominal bleeding, and head injuries.⁴ The most frequent cause of death at the scene of a serious MVA is a descending thoracic aortic injury associated with deceleration.^{2–4} According to Fabian et al, the mortality

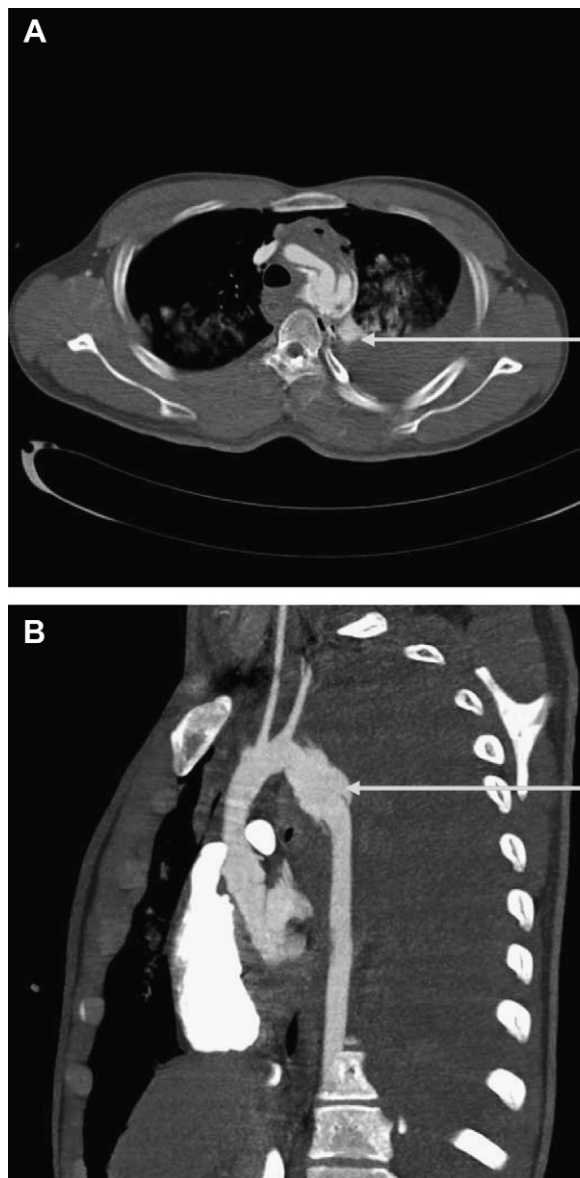


Fig. 2. (A) Axial CT image showing a disruption at the aortic isthmus, with extravasation of contrast media into the left pleural cavity indicative of a hemothorax (arrow). (B) A focal irregular contour at the aortic isthmus (arrow) was also present on the reformatted oblique sagittal thick-section maximum-intensity projection CT image.

rate for untreated aortic injuries is greater than 85%.³ Emergency physicians face a great challenge when making an accurate diagnosis and arranging treatment decisions for these patients owing to the dramatic hemodynamic changes that occur during evaluation in the ED.^{2,5} Sometimes initial treatment decisions are difficult to make because of the presence of atypical signs and symptoms. We therefore suggest that a chest CT should be arranged for any patient suspected of having chest trauma with hemodynamic instability. This should be followed by CT angiography (CTA) if there are any positive findings on the chest CT to rule out aortic injury; CTA scans can provide a highly accurate and early diagnosis within minutes.^{6–8} A high index of suspicion based on the mechanism of injury is critical in the initial workup.

CTA has replaced conventional contrast arteriography as the imaging modality of choice when evaluating aortic injuries; however, it is important to recognize the pitfalls of underestimating the aortic diameter in patients who have undergone resuscitation.⁹ According to Miller et al,¹⁰ before 1999, patients with abnormalities such as a widened mediastinum, an indistinct aortic knob, or a “pleural cap” on a chest radiograph that are suggestive of blunt aortic injury should undergo angiography of the aorta. However, after 1999, helical CT of the chest became the most common method of aortic evaluation when facing mediastinal abnormalities on plain film.^{8,10} As a result, the quality of life-saving procedures has improved. Although blunt thoracic injuries are potentially fatal, early diagnosis and management can be life-saving. For trauma patients with a stable or relatively stable hemodynamic condition, a chest CT with contrast medium is the examination of choice when evaluating an aortic laceration with hemorrhage. If there are any positive findings in terms of aortic injury, a CTA is necessary, because this can help physicians to choose between endovascular stent-grafting or surgical repair as a life-saving treatment.²

In conclusion, rapid transport and resuscitation, an awareness of the mechanism of the injury, the availability of multislice CT, timely intervention, and a prepared trauma team will significantly improve the survival rate of patients with aortic injuries.

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